Lec ④ 15/10/2016

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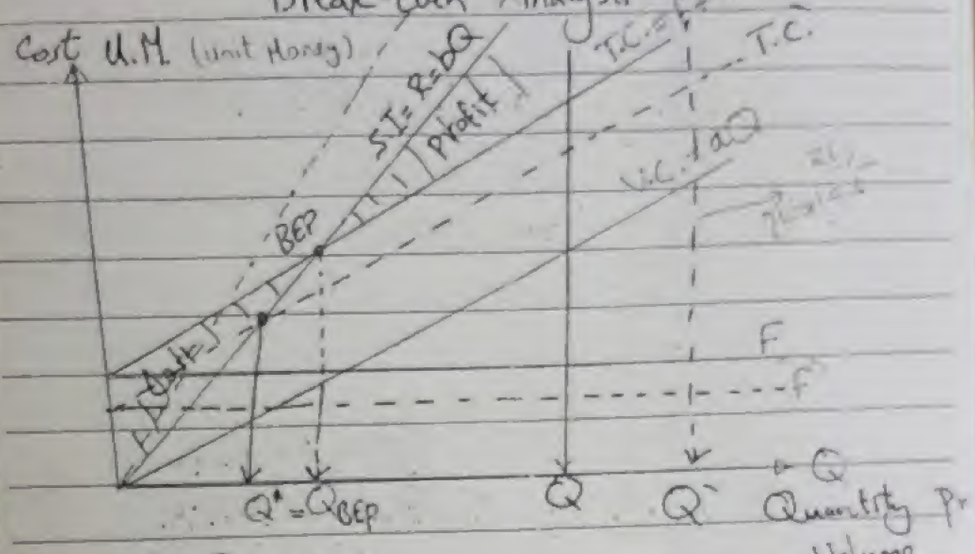
Break-Even Analysis



F.C. = F = Fixed costs

= O.H. Expense + Factory Exp. + Admin. Expense + Selling Expense or Sales costs

V.C. = D.C. = Matls costs → D.M.C + Labor costs → D.L.C

∴ Total cost ⇒ T.C. = F + V.C.

or

a = V.C. / Piece * Q ⟶ V.C = aQ

b = S.I. / Piece → ∴ Revenue = Sales Income = Selling Price = } b·Q

Revenue = T.C. + Profit

S.I. or $R = bQ = F + aQ + Z$

- Break-even Diagram (or chart).
- For one product.
- Balancing.

طرق زيادة الربح

→ Methods of increasing profit

١- تقليل التكاليف الكلية للمنتج الواحد.
٢- زيادة الكمية باستخدام production volume
٣- زيادة سعر بيع المنتج.

Increase the Sales price

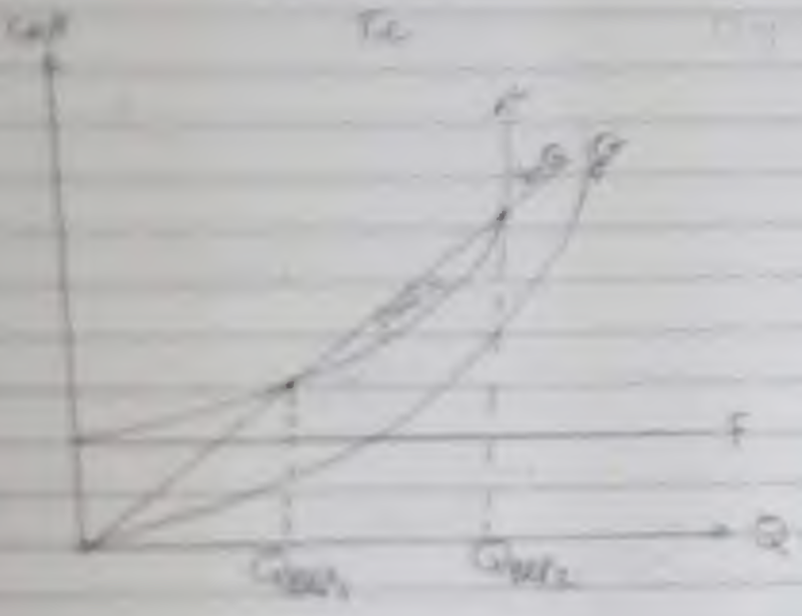
Quality ≡ ↗ Sales (...)

↑

Profit → increase of Quantity Prod. Volume

↓

Reduce of TC



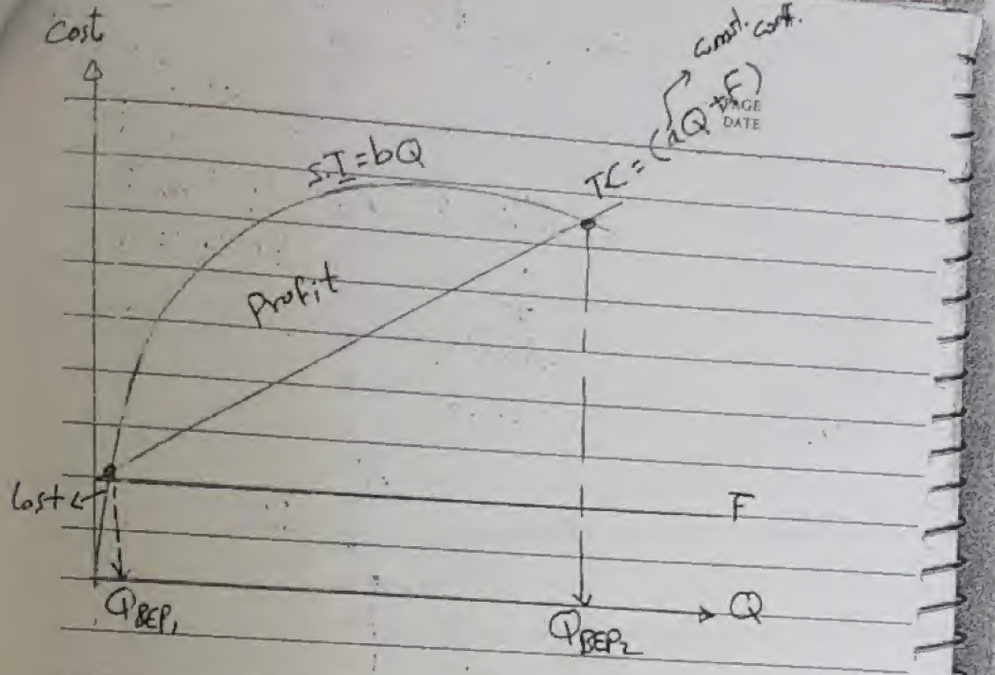
$Z = bQ - TC$

$= bQ - (aQ + F)$

→ Curvature (b·Q)

at max value

$\frac{dZ}{dQ} = 0 \longrightarrow Q$



$S.I. = bQ \rightarrow b = \text{variable} = f_n(Q)$

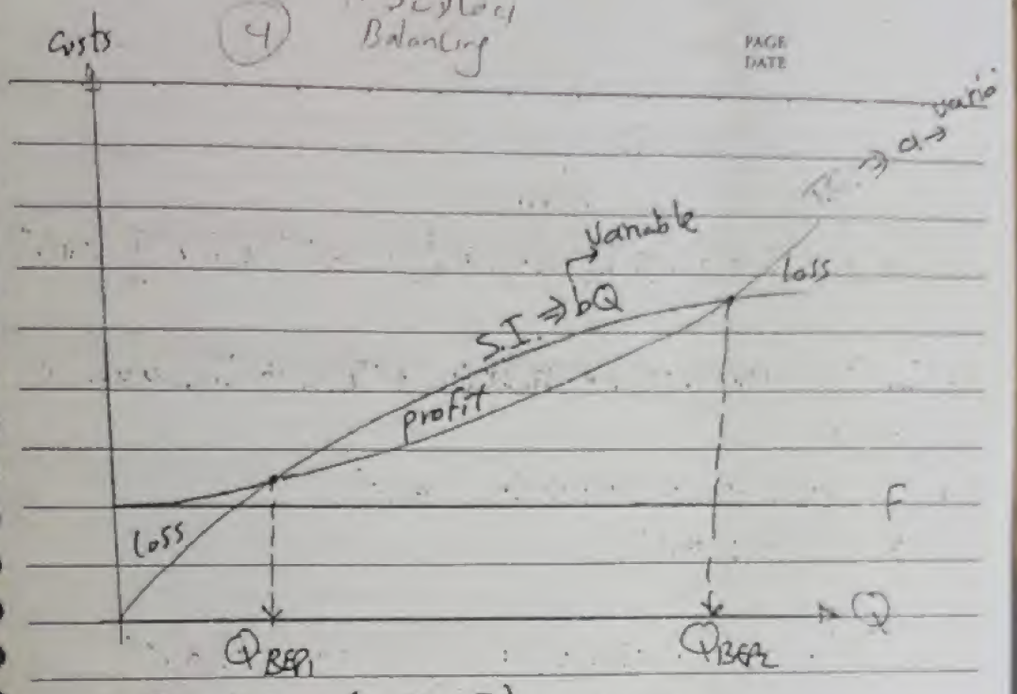
$Z = bQ - (F + aQ)$

↓ variable ↳ const.

at Z_{max} $\frac{dz}{dQ} = 0 \rightarrow Q_{I,II}$

Sales Income → ...

④ Cycle 4 Balancing



$$Z = bQ - (aQ + F)$$

b: variable; (aQ + F): variable

EX: Data

S.I=R Total Sales = $ 40×10^6

Vc Direct labor = $ 12×10^6

F Indirect labor = $ 2×10^6

Vc Direct Material = $ 8×10^6

F Depreciation = $ 1×10^6

F Taxes = $ $0.5 \times 10^6 = \$1.5 \times 10^5$

F Insurance = $ 4×10^5

F Sales cost = $ 1.5×10^6

P.W.

S.W.

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Q = 100 000 units

Soln.

$V.C._1 = D.M.C + D.L.C = ₦(12+8)*10^6 = ₦20*10^6$

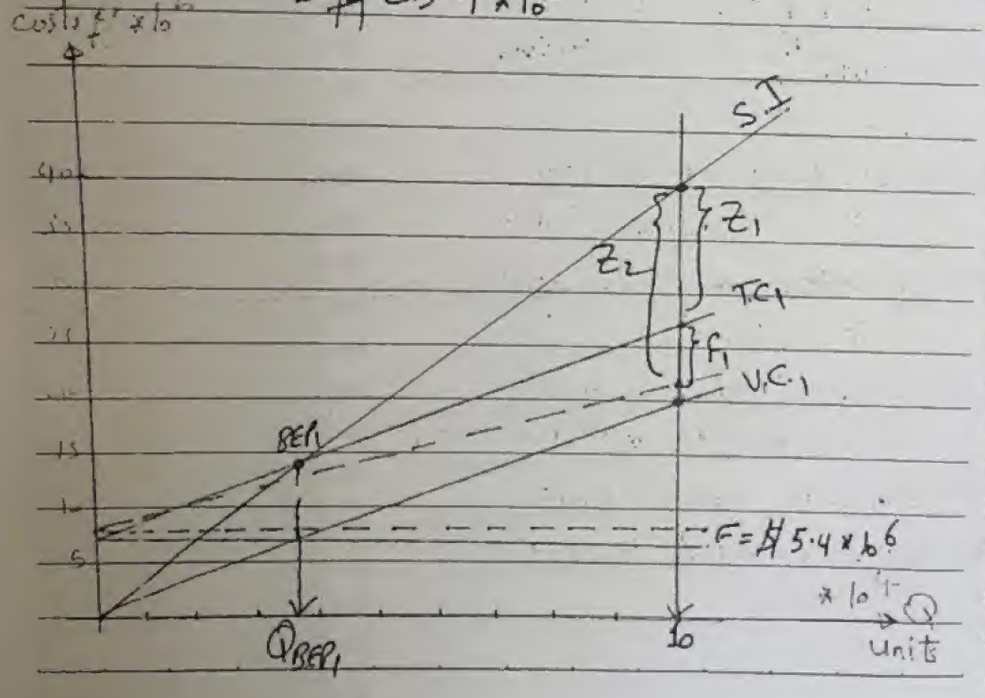
F_1 = Indirect m.c. + Depreciation + Taxes + Insurance + S.C.

$F_1 = ₦(2+1+0.5+0.4+1.5)*10^6$

$= ₦5.4*10^6$

$T.C._1 = V.C.1 + F_1 = ₦(20+5.4)*10^6$

$= ₦25.4*10^6$



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For second case

$F_2 = F_1 + \$1*10^6 = \$6.4*10^6$

$V.C_2 = \$20*10 * \frac{70}{100} = \$14*10^6$

$T.C_2 = F_2 + V.C_2 = \$20.4*10^6$

$Z_1 = \$40*10^6 - \$25.4*10^6 = \$14.6*10^6$

$Z_2 = P_2 = \$40*10^6 - \$20.4*10^6$

$= \$19.6*10^6$

$$\text{Return} = \frac{P_2 \text{ or } Z_2 - P_1 \text{ or } Z_1}{P_1 \text{ or } Z_1} * 100\%$$

$$= \frac{(19.6-14.6)*10^6}{14.6*10^6} * 100 = 34\%$$

Return 1 20% → Return 2 34%

→ they should automate. يستخدم النظام الآلي

مزايا النظام الآلي

1- accuracy 2- Productivity

3- heavy duty 4- good modes

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EX:- ~~Data~~ Given a nonlinear price function of

$b = 21000\,Q^{-\frac{1}{2}}$ L.E. Per unit

$a = 1000$ L.E. Per unit

$F = 1000\,000$ L.E. Per Period

*Required ① BEPs

② production level for max. Profit.

Sol.

$b(Q) = Q\,[21000\,Q^{-\frac{1}{2}}]$ L.E.

$= 21000\,Q^{\frac{1}{2}}$

$Z = bQ - T.C$

$= 21000\,Q^{\frac{1}{2}} - aQ - F$

$= 21000\,Q^{\frac{1}{2}} - 1000\,Q - 1 * 10^6$

at max Profit $\rightarrow \frac{dz}{dQ} = 0$

$\frac{dz}{dQ} = 0 = \frac{21000}{2} Q^{\frac{-1}{2}} - 1000$

$\frac{21000}{2} Q^{\frac{-1}{2}} = 1000 \rightarrow Q^{\frac{-1}{2}} = \frac{2}{21}$

$Q^{\frac{1}{2}} = \frac{21}{2} \rightarrow Q = (10.5)^2 = 110$

$\therefore$ at $Q = 110 \longrightarrow Z_{max}$

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and construct the Break-even chart.